ATTACHMENT 2

Summary of PM10 Monitoring Data: Doña Ana County, New Mexico

Air Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, NM 87502

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Where and How is PM10 Monitored in Doña Ana County?

PM10 MONITORING SITES IN DOÑA ANA COUNTY — Table 1 & Maps (p. 17)

Site locations are given in Table 1 and the attached maps. Since 1993, NMED has increased the number of PM10 monitoring sites in the county from three to eight. Three sites are in the Las Cruces area, and the others are in the southern part of the county.

HOW PM10 IS MEASURED

In Doña Ana County, the NMED Air Quality Bureau uses two types of instruments for measuring PM10 concentration. Both types separate out the finer particles (less than 10 micron diameter) and collect them on a filter for weighing. Average PM10 concentration is determined as the weight of the particles (in micrograms, µg) per volume of air (in cubic meters, m^3) drawn into the sampler during the sampling period.

MEASUREMENT FREQUENCY: DAILY VS. EVERY-SIXTH-DAY 24-HR AVERAGES

Sampler — To obtain a measurement with this instrument, the filter which has collected PM10 must be retrieved by a technician and brought back to the laboratory for weighing. The measurement period is controlled by programming the instrument to start and stop taking in air at the desired times. Normally, this instrument is operated to run for 24 hours (midnight to midnight) so that the resulting measurement is a 24-hr average PM10 concentration. Because this instrument requires manual servicing for each measurement, it is poorly suited for obtaining measurements every day of the year. Before 1994, when the continuous monitors became available, daily data were obtained at some sites by installing several samplers per site and operating them on a staggered schedule.

Continuous Monitor — The other type of instrument operates continuously for periods of weeks. The filter which collects PM10 is weighed continuously and automatically by the instrument. This monitor calculates real-time PM10 concentrations which are normally converted to one-hour and 24-hour averages for every day. Now that these continuously-operating instruments are providing daily measurements at all but one site, the one-measurement-per-day type samplers are normally operated only on every 6th day to provide data for comparative purposes.

Seven sites in the county have only the continuous-measurement type of monitor, one has only the sampler normally operated every 6th day, and two sites have both types.

TABLE 1. NMED'S PM10 MONITORING SITES IN DOÑA ANA COUNTY

Code & Name	Location	Monitor Type(s)	Start of Continuous
LAS CRUCES AREA			
6R Las Cruces ED	Environment Dept. District Off. 1001 N. Solano Dr. Las Cruces, NM	Sampler	
6ZJ Roadrunner	Roadrunner Blvd. near Well #45 East Mesa of Las Cruces	Continuous	Nov 1995
6ZL Holman	Holman Rd. near Well #41 Near Butterfield Park, N. of US70	Continuous	Oct 1995
SOUTH COUNTY AREA			
6ZK Chaparral	Chaparral Mid School 680 McCombs Chaparral, NM	Continuous	Feb 1996
6CM Anthony	Anthony Elementary School Anthony, NM	Both	Dec 1994
6ZG Sunland Park City Yard	Sunland Park City Yard McNutt & Anapra Rd. Sunland Park, NM	Both	Aug 1994
6ZM Sunland Park Desert View	Desert View Elementary School 5935A Valle Vista Sunland Park, NM	Continuous	Feb 1996
6ZN Santa Teresa Xing	Santa Teresa Border Crossing 104-2 Sta. Teresa Intl. Blvd. Santa Teresa, NM	Continuous	Jan 1996

How Many Times
Has the Federal Standard been Exceeded?

NUMBER OF 24-HR AVERAGES EXCEEDING THE STANDARD — Table 2

Table 2 gives the number of measured 24-hr averages that have exceeded the federal standard level of 150 $\mu g/m^3$ in recent years. Some things to note about these data are:

1) Some sites had data for only a small fraction of the days in a year, either because the measurements started during that year or because the instrument used was the sampler type that is often operated on a less-than-daily schedule. Sites with less-than-daily measurements may have recorded fewer exceedances simply because the sampler was not operating on days when PM10 concentrations were high. In cases when there were as few as 61 measurements per year (sampling every sixth day), the number of exceedances that actually occurred would likely have been five times as many as observed. This issue is examined in more detail in the following table (Table 3).

2) The number of sites recording exceedances increased from 0 out of 3 in 1993 to 7 out of 8 in 1996 (note that five new sites had been started by 1996).

3) 1996 was an exceptional year; compared to recent years, the number of exceedances was unusually high, especially at the sites in the southern part of the county. In the Las Cruces area, exceedances were recorded for the first time in recent years (at sites that were new in 1996).

Ambient Air Quality Monitoring Data For Doña Ana County

for particulate matter less than 10 microns in diameter (= PM10)

TABLE 2. NUMBER OF PM10 DAILY AVERAGES AND NUMBER EXCEEDING STANDARD

Federal standard is 150 ug/m3 for values rounded to nearest 10 ug/m3

Site	Monitor Type	Number of daily averages: Total 1993	Total 1994	Total 1995	Total 1996	Exceeding 150 ug/m3: 1993	Exceeding 150 ug/m3: 1994	Exceeding 150 ug/m3: 1995	Exceeding 150 ug/m3: 1996
LAS CRUCES AREA									
Las Cruces ED	S	61	61	61	61	0	0	0	0
Roadrunner Blvd.	C	...	...	40	357	...	...	0	6
Holman Rd.	C	...	...	32	365	...	...	0	8
SOUTH COUNTY AREA									
Chaparral	C	...	...	...	321	...	...	...	11
Anthony	S	178	182	59	61	0	0	0	0
Anthony	C	...	...	354	361	...	...	6	12
Sunland Park CY	S	346	239	73	59	0	0	1	0
Sunland Park CY	C	...	141	351	364	...	3	2	18
SP-Desert View	C	...	...	...	316	...	...	...	10
Santa Teresa Xing	C	...	...	...	339	...	...	...	14

Monitor Type: S = Sampler, normally run for 24 hr every 6th day

C = Continuous, automated continuous sampling every day

Why Did Some Instruments Record Few or No Exceedances in 1995-1996?

LESS-THAN-DAILY MEASUREMENTS MISSED MOST RECENT EXCEEDANCES — Table 3

The instruments that recorded few or no exceedances in 1995-1996 were the sampler type instruments at Las Cruces ED, Anthony and Sunland Park City Yard. Since 1995, these instruments have been operated only on every sixth day. They are operated on this reduced schedule because they require manual servicing each time a measurement is made. One possible explanation for the fewer exceedances recorded by the sampler type instruments is that they were not scheduled to be operating on most days when PM10 concentrations were high. We can examine this possibility by seeing how often the samplers were operating on days when nearby continuous monitors recorded exceedances. This comparison is given in Table 3.

At Anthony and Sunland Park City Yard, both types of instruments are located together. The Las Cruces ED site has only the sampler, but exceedances at the other two Las Cruces area sites (Holman Road and Roadrunner Blvd), which had continuous monitors, can be used to indicate days when exceedances might have been expected at the Las Cruces ED site.

The data in Table 3 show that the samplers were not being operated on most days when exceedances were recorded at nearby continuously-operated monitors. To put this another way, most days with high PM10 levels happened to occur, by chance, on days when the samplers were not scheduled to take a measurement.

These results have important implications for the status of the Las Cruces urban area. Although exceedances were recorded only by the continuous monitors at the eastern fringe of the urban area, it is likely that exceedances also occurred in the built-up central area of the city but were not measured because the sampler at Las Cruces ED offices was not operating on those days. The surrounding of the Las Cruces site are mostly paved and built-up, whereas the Holman and Roadrunner sites have more open desert and dirt roads in their immediate vicinity. It is possible that exceedances were less frequent or less severe at the ED site because of its surroundings, but the more complete data sets from the nearby Holman and Roadrunner sites are the best available indicators of whether a violation occurred at the ED site.

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TABLE 3. COMPARISON OF MONITOR TYPES, 1995 - JUNE 1997

Site Pair	Continuous Monitor Exceedance Days	Sampler, On Days with Exceedances at Continuous Monitors		
		No Measurement	Measured, No Exceedance	Measured, Exceedance
S - Las Cruces ED C - Roadrunner and/or Holman	11	11	0	0
S - Anthony C - Anthony	25	23	2	0
S - Sunland Park CY C - Sunland Park CY	23	20	2	1

How High Were Recent PM10 Values?

HIGHEST PM10 VALUES — Table 4

Table 4 gives the highest and 2nd highest values for PM10 concentration for each site and year. The maximum values for 1996 at Roadrunner Blvd., Anthony, and Sunland Park City Yard were very high, from 6 to 10 times the federal standard.

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TABLE 4. EXTREME VALUES OF 24-hr AVERAGE PM10 CONCENTRATION

data in micrograms per cubic meter (ug/m3)

Site	Monitor Type	Highest and 2nd Highest 24-hour Averages							
		1993		1994		1995		1996	
LAS CRUCES AREA									
Las Cruces ED	S	56	40	53	50	71	51	93	40
Roadrunner Blvd.	C	...	...	...	...	79	60	**1,065**	**399**
Holman Rd.	C	...	...	...	...	40	40	**806**	**382**
SOUTH COUNTY AREA									
Chaparral	C	...	...	...	...	...	...	**803**	**532**
Anthony	S	99	98	154	126	142	84	81	78
Anthony	C	...	...	...	...	**310**	**272**	**1,514**	**490**
Sunland Park CY	S	103	93	106	103	**158**	119	133	116
Sunland Park CY	C	...	...	**491**	**402**	**309**	**183**	**1,448**	**503**
SP-Desert View	C	...	...	...	...	...	...	**481**	**398**
Santa Teresa Xing	C	...	...	...	...	...	...	**435**	**329**

Bold = Exceeds federal standard of 150 ug/m3 (for values rounded to nearest 10 ug/m3)

Monitor Type: S = Sampler, normally run for 24 hr every 6th day

C = Continuous, automated continuous sampling every day

When Did Recent PM10 Exceedances Occur?

Table 5 lists all the PM10 exceedances from April 1995 through June 1997. On some days, only one site recorded an exceedance. On other days, all of the sites that were operating that day recorded exceedances. Exceedances were most likely in February and March.

DUST STORMS

NMED Air Quality Bureau staff have analyzed all the weather and other local conditions associated with exceedances that occurred between January 1995 and March 1997. Results were published in a report entitled "Analysis of PM10 Exceedances January 1995 - March 1997, Doña Ana County, New Mexico". This report concluded that most of the exceedances were due to blowing dust raised by high winds. Dust storms were especially severe in 1996 because of the extreme drought of late 1995 and early 1996.

OTHER CAUSES

As indicated in Table 5, the Bureau's report attributed one exceedance at Chaparral and many at Santa Teresa Border Crossing to dust raised by adjacent construction activities. Two exceedances at Sunland Park City Yard were attributed to an industrial accident at the Asarco Smelter just across the state line in Texas.

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TABLE 5. PM10 MEASUREMENTS ON DAYS WITH EXCEEDANCES, APRIL 1995 THROUGH JUNE 1997

(Federal standard is 150 ug/m3, for values rounded to nearest 10 ug/m3)

	24-hr average PM10 concentration in micrograms per cubic meter of air									
	LAS CRUCES ED	ROAD-RUNNER	HOLMAN	CHAPARRAL	ANTHONY	ANTHONY	SUNLAND PARK CY	SUNLAND PARK CY	S.P.-DESERT VIEW	SANTA TERESA XING
DATE	S	C	C	C	S	C	S	C	C	C
1995										
9-Apr	<std	ns	ns	ns	<std	310	158	309	ns	ns
5-May	ns	ns	ns	ns	ns	191	ns	ns	ns	ns
16-May	ns	ns	ns	ns	ns	175	<std	ns	ns	ns
22-May	ns	ns	ns	ns	ns	176	<std	<std	ns	ns
11-Jun	ns	ns	ns	ns	ns	215	ns	<std	ns	ns
22-Oct	ns	ns	ns	ns	ns	272	ns	183	ns	ns
1996										
17-Jan	ns	1065	806	ns	ns	1514	ns	1448	ns	ns
22-Jan	<std	<std	<std	ns	<std	<std	<std	235	ns	ns
10-Feb	ns	<std	<std	ns	ns	176	ns	<std	<std	<std
11-Feb	ns	<std	<std	ns	ns	478	ns	230	182	223
18-Feb	ns	399	<std	236	ns	<std	ns	160	<std	<std
22-Feb	ns	<std	<std	176	ns	ns	ns	<std	<std	<std
25-Feb	ns	<std	<std	<std	ns	246	ns	<std	<std	<std
26-Feb	ns	<std	<std	305	ns	<std	ns	405	216	219
28-Feb	ns	<std	<std	<std	ns	<std	ns	218	166	<std
13-Mar	ns	252	382	330	ns	490	ns	400	309	205
17-Mar	ns	212	239	296	ns	162	ns	299	<std	166
23-Mar	ns	<std	191	803	ns	447	ns	483	451	435
25-Mar	ns	<std	<std	<std	ns	<std	ns	207	<std	<std
26-Mar	ns	<std	<std	<std	ns	<std	ns	177	189	265
29-Mar	ns	277	252	532	ns	305	ns	503	398	329
13-Apr	ns	264	265	224	ns	<std	ns	<std	<std	ns
28-Apr	ns	<std	<std	<std	ns	198	ns	<std	<std	<std
13-May	ns	ns	<std	<std	ns	<std	ns	236	<std	194
6-Jun	ns	<std	189	<std	ns	<std	ns	<std	<std	<std
7-Jun	ns	<std	<std	<std	ns	ns	ns	219	182	171
24-Jun	ns	<std	<std	<std	ns	<std	ns	164	172	<std
26-Jul	<std	<std	<std	*176	<std	<std	<std	<std	<std	<std
3-Oct	ns	<std	<std	<std	ns	<std	ns	<std	<std	*294
18-Oct	ns	<std	<std	<std	<std	<std	<std	<std	<std	*268
21-Oct	ns	<std	<std	<std	ns	196	ns	<std	<std	*201
25-Oct	ns	<std	202	260	ns	267	ns	218	268	*215
10-Nov	ns	<std	<std	<std	ns	<std	ns	**157	<std	<std
11-Nov	<std	<std	<std	<std	<std	<std	ns	**158	<std	<std
16-Nov	ns	<std	<std	252	ns	190	ns	<std	<std	<std
27-Nov	ns	<std	<std	<std	ns	<std	ns	<std	<std	*181
1997										
3-Jan	ns	<std	<std	227	ns	<std	ns	<std	<std	ns
12-Jan	ns	<std	<std	<std	ns	<std	ns	<std	<std	*594
13-Jan	ns	<std	<std	<std	ns	<std	ns	<std	<std	*360
6-Feb	ns	<std	<std	<std	ns	214	ns	<std	<std	*162
24-Feb	ns	<std	194	<std	ns	192	ns	227	492	*967
25-Feb	ns	<std	<std	<std	ns	<std	ns	<std	<std	*183
28-Feb	ns	<std	<std	<std	ns	<std	ns	190	295	*360
14-Mar	ns	<std	<std	<std	ns	<std	ns	<std	<std	*215
24-Mar	ns	<std	155	<std	ns	157	ns	<std	<std	<std
25-Mar	ns	<std	<std	<std	ns	158	ns	<std	<std	<std
30-Mar	ns	<std	<std	<std	ns	<std	ns	<std	<std	*179
9-Apr	ns	<std	<std	<std	ns	<std	ns	<std	225	*185
10-Apr	<std	<std	<std	324	<std	298	<std	315	438	*423
24-Apr	ns	<std	<std	201	ns	244	ns	428	534	*579
9-May	ns	<std	<std	<std	ns	168	ns	<std	<std	*164

NOTES: ns = no sample

<std = less than 150 (for values rounded to nearest 10)

Monitor Type: S = Sampler, sample collection usually not every day

C = Continuous: automated continuous sampling, usually every day

Data Flags: all values shown = high wind flag, except

** = industrial accident

* = adjacent construction

Annual Average PM10 Levels

Table 6 gives the annual mean PM10 concentration. The federal standard states that the annual mean, averaged over 3 years, should not exceed 50 $\mu g/m^3$. Annual averages greater than this value are therefore of concern.

Table 6 gives values for the arithmetic mean calculated in two ways: 1) using all the days with measurements ("including flagged days"), and 2) excluding days which had high values because of natural events (such as high wind), industrial accidents or nearby construction activities. As described earlier, the NMED Air Quality Bureau has issued a report in which all exceedances of the 24-hr standard (150 $\mu g/m^3$) during January 1995 through March 1997 have been attributed to high wind events (dust storms), an industrial accident, or construction near the monitor. Following standard procedures specified in federal rules, the Air Quality Bureau has "flagged" these data in EPA's database to indicate that they should be excluded from determinations of nonattainment status for both the 24-hr and annual PM10 standards. EPA will make a determination on whether these data can be excluded after they examine the Air Quality Bureau's report analyzing these exceedances.

Some things to notice about the data in Table 6 are:

1) Annual average PM10 concentration has been consistently higher in the south county area than in the Las Cruces area;

2) No site has yet violated the annual standard (3-yr average above 50 $\mu g/m^3$), but several have had annual means greater than 40 $\mu g/m^3$;

3) Whether or not flagged days are excluded could eventually make a difference in attainment status for the south county area; in 1996, 4 of the 5 south county sites exceeded the 50 $\mu g/m^3$ level if flagged days were included;

4) If EPA allows the exclusion of flagged days, only the Anthony site would have exceeded the standard in 1995 and 1996 (Anthony is currently nonattainment for the 24-hr standard because of exceedances that occurred in 1988-1990).

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TABLE 6. ANNUAL MEAN PM10 CONCENTRATION

Federal standard is 50 ug/cm3 averaged over three years

Site	Monitor Type	Annual Arithmetic Mean: Including Flagged Days 1993	1994	1995	1996	Excluding Flagged Days 1993	1994	1995	1996
LAS CRUCES AREA									
Las Cruces ED	S	21	22	24	24	21	22	24	24
Roadrunner Blvd.	C	...	...	...	34	...	...	...	28
Holman Rd.	C	...	...	...	36	...	...	...	30
SOUTH COUNTY AREA									
Chaparral	C	...	...	...	56	...	...	...	41
Anthony	S	37	41	40	38	37	40	40	38
Anthony	C	...	...	57	68	...	...	55	56
Sunland Park CY	S	32	37	40	38	32	37	39	38
Sunland Park CY	C	...	...	47	62	...	...	46	49
SP-Desert View	C	...	...	...	55	...	...	...	46
Santa Teresa Xing	C	...	...	...	44	...	...	...	35

Monitor Type: S = Sampler, normally run for 24 hr every 6th day

C = Continuous, automated continuous sampling every day

Pollutant Standard Index (PSI) — A System for Describing Air Health Quality

For most people, air quality monitoring is useful when it answers the question "How healthful (or unhealthful) is the air?" The Pollutant Standard Index (PSI) system is used nationwide for reporting air pollution levels in terms of health quality.

TABLE 7. PSI LEVELS IN RELATION TO PM10 CONCENTRATION.

PM10 Concentration $\mu g/m^3$	PSI Values	PSI Descriptor
Up to 50	Up to 50	Good
50 to 150	50 to 100	Moderate
150 to 350	100 to 200	Unhealthful
350 to 420	200 to 300	Very Unhealthful
Over 420	Over 300	Hazardous

General health effects and cautionary statements associated with different levels of the Pollutant Standard Index are given in Table 8.

TABLE 8. HEALTH EFFECTS AND CAUTIONARY STATEMENTS FOR PSI LEVELS

PSI Descriptor	PSI Values	General Health Effects	Cautionary Statements
Good	Up to 50	None for the general population.	None required.
Moderate	50 to 100	Few or none for the general population.	None required.
Unhealthful	100 to 200	Mild aggravation of symptoms among susceptible people, with irritation symptoms in the healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity. General population should reduce vigorous outdoor activity.
Very Unhealthful	200 to 300	Significant aggravation of symptoms and decreased exercise tolerance in persons with heart or lung disease; widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors and reduce physical activity. General population should avoid vigorous physical activity.
Hazardous	Over 300	Early onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons. At PSI levels above 400, premature death of ill and elderly persons may result. Healthy people experience adverse symptoms that affect normal activity.	Elderly and persons with existing diseases should stay indoors and avoid physical exertion. At PSI levels above 400, general population should remain indoors, keeping windows and doors closed, and minimize physical exertion.

PSI Values for PM10 in 1996

These graphs show the percentage of measured days during 1996 in each of the five PSI categories ("Good", "Moderate", and so forth). In these graphs, PSI categories for air quality are given only in relation to PM10 — that is, other pollutants were not considered, as they would be if a measure of overall quality was presented.

These graphs show:

a) Air quality was healthful (Good or Moderate) on the great majority of days at all sites;

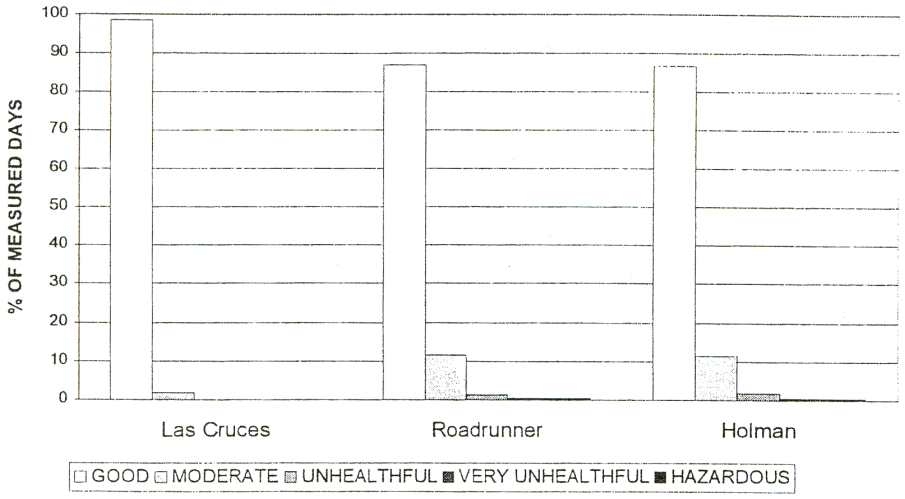
b) Las Cruces area sites, with over 85% Good days, had better air quality than the south county sites;

c) Anthony and Sunland Park sites had fewer Good and more Moderate days than the other sites.

The high percentage of Moderate days (PM10 levels between 50 and 150 $\mu g/m^3$) at Anthony and Sunland Park is the main reason for their high annual average PM10 level, as shown previously in Table 6. Some of the Moderate days may have resulted from stagnant air conditions trapping smoke, soot and dust generated in the nearby El Paso-Juarez area. Other Moderate days may have resulted from high wind events (dust storms) that raised PM10 levels, but not to the 150 $\mu g/m^3$ level used in selecting possible days for flagging as high wind events. Further analysis may be needed.

PM10 AIR QUALITY IN 1996

LAS CRUCES AREA



SOUTH COUNTY AREA